A MULTIFUNCTIONAL MULTI-TAP (CONCENT) OF INTERCEPTING A STAND-BY ELECTRIC POWER AND A CONTROL METHOD EMPLOYING THE SAME

FIELD OF THE INVENTION

The present invention relates to a multi-tap, particularly to a multifunctional multi-tap (concent) of intercepting a stand-by electric power and a control method employing the same, wherein an interlocking control and a single-acting control (separate control) are performed in accordance with the subordination of electrical appliances by using an illumination sensor or a body-detecting sensor, the introduction of over current or surge current is avoided, and the current capacity which is different according to the electric appliances is detected to adjust the capacity of the multi-tap (concent) to comply with the capacity of the appliance.

BACKGROUND OF THE INVENTION

Generally, electric appliances which are used in a house, an office, or a factory are classified into two groups, i.e., those which need to be supplied with power all the time such

as a refrigerator and those which need to be supplied with power on occasion such as a television, an audio, and a computer monitor.

However, even in the latter type of appliances, most of them are connected to a power source all the time since the power source is usually connected to a outlet located on a wall or a floor so the blocking of the power is inconvenient.

FIG. 1 shows the construction of a power supply system for an electric appliance 200. As shown, an electric energy is supplied to an appliance by connecting a plug 200 of the appliance to an alternating current power or a general outlet 100. In most cases, the appliance is used by being continuously connected with the power due to the inconvenience in blocking the power.

Accordingly, due to such leakage of current, electric power has been consumed unnecessarily and there exists a possibility of a big fire. The total sum of the wasted electric power nationwide is considerable.

In order to overcome such problem caused due to the current leakage of an appliance, a multi-type standby current intercepting multi-tap has been rolled out. This type of multi-tap detects the state whether or not a user operates a computer by using the clock signal and the data signal of a mouse and a keyboard, which are the input devices of

a computer. If it is determined that the computer is not being used, the power is intercepted not to be supplied to the peripherals.

If a user reuses the computer, the power is supplied to the peripherals again. By doing such, the power can be saved when a user is not using the computer but the computer is on.

To avoid the current leakage, a outlet including a control module for interlocking the mainframe and the peripherals of a computer is also used. Herein, according to the interlocking control, the mainframe of a computer is connected to the main lead-in hole and the peripherals (for example, a printer and a monitor) are connected to the auxiliary lead-in holes. Thus, if the mainframe of the computer is turned off, the multi-tap detects and intercepts the standby power not to be supplied to the peripherals so that the wasted power can be saved.

On the contrary, according to the single-acting control, appliances are individually connected to the auxiliary lead-in holes regardless of the main lead-in hole, and the multi-tap detects and supplies/intercepts the standby electric power. Hereinafter, the interlocking control and the single-acting control will be described as the aforementioned meaning.

Even remote-control power-saving outlet devices are

widely used for the aforementioned type of multi-tap.

However, in the case of the outlet employing the interlocking control function, it has deficiency in precisely detecting the peripherals and sensitively controlling the on/off operation.

Also, the above conventional multi-tap has the problem in that it does not work its own function (i.e., the interlocking control) if the current capacity is used for different appliances at the same time.

SUMMARY OF THE INVENTION

The present invention is provided to overcome the foregoing stated problem which the prior art contains. It is the primary object of the present invention to provide a multifunctional multi-tap (concent) of intercepting a stand-by electric power and a control method employing the same, wherein an illumination sensor or a body-detecting sensor automatically detects the time period when electric power does not need to be supplied to an appliance such as a television or a monitor, which does not need the constant supply of electric power, and the power of the appliance is turned on/off according to the detected signal, so that unnecessary leakage of electric power can be avoided and a fire caused from the leakage current can be prevented.

It is another object of the present invention to provide a multifunctional multi-tap (concent) of intercepting a stand-by electric power and a control method employing the same, wherein the illumination sensor or the body-detecting sensor makes the interlocking control of an appliance and its subordinated appliances

It is another object of the present invention to provide a multifunctional multi-tap (concent) of intercepting a stand-by electric power and a control method employing the same, wherein the current capacity is adjusted according to the appliances, which have their own current capacities, so that the outlet is compatible with different appliances.

It is another object of the present invention to provide a multifunctional multi-tap (concent) for intercepting a standby electric power and a control method employing the same, wherein according to the on/off state of a main appliance such as the mainframe of a computer, the powers of the peripheral appliances interlocked with the main appliance are on/off, and further, apart from the interlocking control, the user can operate the appliances individually by his/her selection.

In order to achieve the above objects of the present invention, a multifunctional multi-tap (concent) of intercepting a stand-by electric power comprises: an over-current circuit breaker for detecting and intercepting

an over-current or a surge current generated due to an disorder of an appliance; a power section for generating and outputting a motion voltage which is supplied to the parts inside of the multi-tap (concent) through the rectification, smoothing and voltage regulation process; a motion condition setting part in which a user switches and sets the condition whether or not a sensor is used and whether an interlocking control or a single acting control is adopted, and which outputs the switching signal; a sensor part for detecting a light or a body motion and outputting a signal accordingly; a current detecting part for detecting a current flowing into an interacting or a single-acting appliance and outputting the detected signal; a control part which receives the user's switching signal for the selection of the interlocking/single-acting function and the detected signal, determines the detected signal of the sensor, and outputs an on/off control signal for controlling the appliance, which is led into each lead-in hole, as a standby state or a power-saving state according to the interlocking or single-acting condition; and an output control part which receives the on/off control signal of the control part and supplies/intercepts the power current flowing into each lead-in holes.

Also, A control method of multifunctional multi-tap (concent) of intercepting a stand-by electric power comprises

the steps of: a) determining whether there is a change in light by a sensor; b) setting a main lead-in hole as a standby state, in case that there is a change in light as a result of the determination; c) determining which auxiliary lead-in hole is interlocked or single-acted; d) determining whether or not the main lead-in hole is currently used, in case that a predetermined number of auxiliary lead-in holes are interlocked as a result of step (c); e) turning on all of the predetermined number of the interlocked auxiliary lead-in holes in case that the main lead-in hole is currently used as a result of step (d),; f) turning off all of the predetermined number of the interlocked auxiliary lead-in holes in case that the main lead-in hole is not currently used as a result of step (d); and g) turning off all of the predetermined number of the single-acted auxiliary lead-in holes, in case that a predetermined number of auxiliary lead-in holes are single-acted as a result of step (c).

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an examplary view showing a system for supplying electric power to an appliance according to the prior art.

FIG. 2 is a block diagram showing the construction of a multifunctional multi-tap (concent) of intercepting a stand-by electric power according to the present invention.

FIGS. 3-8 are detail circuit diagrams showing each part of the multifunctional multi-tap (concent) of saving electric power of FIG. 2.

FIG. 9 is a motion flow chart showing a control method of the multifunctional multi-tap (concent) of intercepting a stand-by electric power according to the present invention, if an illumination sensor is used.

FIG. 10 is a motion flow chart showing a control method of the multifunctional multi-tap (concent) of intercepting a stand-by electric power according to the present invention, if an illumination sensor and a body-detecting sensor are used at the same time.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Hereunder, with reference to the attached drawings, a preferred embodiment is illustrated for the multifunctional multi-tap (concent) of intercepting a stand-by electric power and a control method employing the same according to the present invention, in which an illumination sensor or a body-detecting sensor detects whether there is a change in light or whether there is a person around each of the lead-in holes under the interlocking or single-acting control; the detected signal supplies or intercepts the commercial alternating current applied to each lead-in hole according

to the interlocking or single-acting control condition; the current value of respective appliances is selectively adjusted so that the multi-tap (concent) can be compatible with the appliances with different current capacity.

FIG. 2 is a block diagram showing the construction of a multifunctional multi-tap (concent) of intercepting a stand-by electric power according to the present invention.

As shown, the multifunctional multi-tap (concent) of intercepting a stand-by electric power according to the present invention comprises: an over-current interceptor 1 for intercepting or supplying a commercial alternating current by detecting the over-current or surge current flowing into an appliance due to a disorder of an appliance; a power part 2 for generating and outputting a motion voltage, which is to be provided from a commercial alternating current power to each part of the multi-tap (concent) through the rectification, smoothing and voltage regulation process, and a clock signal for driving a timer built in a control part 6, which will be described below; a motion condition setting part 3 for setting the condition according to a user's switching operation regarding whether or not a sensor is used and whether appliances are interlocked or single-acted, and outputting a switching signal accordingly; a sensor part 4 for detecting an illuminance or body motion and outputting a signal accordingly; a current detecting part 5 for detecting

a current flowing into an interlocked or single-acted appliance and outputting a signal accordingly; a control part 6 which receives the switching signal and the detection signal, determines the detection signal of the sensor part 4, and outputs an on/off control signal for controlling an appliance, which is lead in each lead-in hole according to the interlocking or single-acting condition, with the standby or power-saving state; and an output control part 7 for supplying or intercepting current flowing into each appliance according to the on/off control signal of the control part 6.

Generally, the commercial alternating current power used in Korea is the one for 220V and 60 hZ.

Thus, the multi-tap (concent) of the present invention is set for 220V and 60 hZ. However, if it is used in other country with different commercial alternating current, it is, of course, possible to adapt to the different power.

The multifunctional multi-tap (concent) of intercepting a stand-by electric power according to the present invention operates as follows.

First, the over-current interceptor 1 intercepts or supplies a commercial alternating current power by detecting the over-current or surge current flowing into an appliance due to a disorder of an appliance.

The power part 2 generates a motion voltage, which is

to be provided from a commercial alternating current power to each part of the multi-tap (concent) through the rectification, smoothing and voltage regulation process. Herein, the motion voltage generated by the power part 2 is mainly the direct current voltage of 5V to 12V, and the 12V is used for the power of each relay RY1-RY6 built in the output control part 7 and 5V is used for the powers of the parts other than the above relays.

Also, the power part 2 generates a clock signal for driving a timer (not shown) built in the control part 6. If the change of illuminance or the motion of a human body is not detected by the sensor part 4, the timer is operated for a predetermined time period to automatically intercept the power applied to an interlocked or single-acted appliance. The timer and its function will be detailedly explained later.

The motion condition setting part 3 sets the condition according to a user's switching operation regarding whether or not a sensor is used and whether appliances are interlocked or single-acted, and outputs the switching signal to the control part 6. Herein, the interlocking condition can be set so that while a main appliance such as a mainframe of a computer is being connected to the main lead-in hole CON1, the appliances interlocked with the main appliance such as the peripherals of a computer can be supplied with or blocked from the power.

If the user desires to use a television or an audio individually apart from the appliances which are set by the above interlocking condition and connected to the auxiliary lead-in holes, the user can set a single-acting condition by a simple switching operation for the television or the audio.

Also, the motion condition setting part 3 can select by a user's simple switching operation regarding whether only the illumination sensor is to be used or the illumination sensor and the body-detecting sensor are to be used at the same time.

Thereafter, the switching signal according to the interlocking or single-acting condition and the switching signal according to the selection of the sensor are transferred to the control part 6.

The sensor part 4, as above described, comprises the illuminance sensor or the body-detecting sensor which can be alternatively selected by the user at the motion condition setting part 3, and detects an illuminance or body motion to output the signal to the control part 6.

The current detecting part 5 detects a current flowing into an interlocked or single-acted appliance to output the detection signal to the control part 6.

Thereafter, the control part 6 receives the switching signal and the detection signal and outputs an on/off control

signal to control the power applied to each appliance which is interlocked or single-acted. In other words, the control part 6 receives the switching signal from the user's switching to select the interlocking or single-acting condition, and receives the detection signal from each of the interlocked or single-acted appliances. And the control part 6 determines the detection signal transferred from the sensor part 4 and outputs an on-off control signal to the output control part 7 according to the interlocking or single-acting condition. Herein, the control part 6 is implemented with a microprocessor.

The control method of the multi-tap (concent) according to the present invention will be detailedly explained in the description regarding FIGS. 9 and 10.

The output control part 7 supplies or intercepts the current flowing into each appliance according to the on/off control signal of the control part 6. Herein, the output control part 7 can be implemented with a relay device and supplies or intercepts the power to each appliance according to its own on-off state.

FIGS. 3-8 are detail circuit diagrams showing each part of the multifunctional multi-tap (concent) of intercepting a stand-by electric power of FIG. 2.

FIG. 3 is a detail circuit diagram showing the over-current interceptor and the power according to FIG.

2.

As shown, the over-current interceptor 1 intercepts a commercial alternating current power by detecting the over-current or surge current flowing into an appliance due to a disorder of an appliance. Once the reason for the over-current is eliminated, the power is supplied again by the user's operation of a reset button. Herein, the range of the interceptable over-current varies depending upon the over-current intercepting devices and can be predetermined and set at the initial manufacturing stage.

The power part 2 converts the commercial alternating current power into a direct current power and supplies the same to each part of the multi-tap (concent).

Specifically, the commercial alternating current power is down-transformed into a predetermined alternating current voltage through a down transformer. Next, the alternating current voltage is full-wave rectified through a bridge circuit formed with 4 diodes D1-D4. The full-wave rectified alternating current voltage is smoothed through a capacitor to be a direct current voltage of 12V. The 12V direct current voltage is used as an operating voltage for driving the relay device of the output control part 7.

Also, the direct current voltage of 12V is down-transformed into the one of 5V through a constant voltage circuit and used for operating the microprocessor of the

control part 6, the motion condition setting part 3, and the illuminance sensor and the body-detecting sensor of the sensor part 4.

Meanwhile, the power part 2 generates a clock signal for driving the timer (not shown) built in the control part 6. In other words, the alternating current voltage which was down-transformed through the down-transformer, generates an on-off signal through a transistor Q3, and the on/off signal is used as a clock signal for driving the timer built in the microprocessor of the control part 6.

FIG. 4 is a detail circuit diagram showing the motion condition setting part according to FIG. 2.

As shown, the motion condition setting part 3 consists of an array resister RA1 and switches SW1-SW6. The switches SW1-SW6 are disposed outside of an outlet so that a user can choose whether the appliance corresponding to each of the auxiliary lead-in holes CON2-CON6 is used in the interlocking condition or the single-acting condition.

Herein, if the main lead-in hole CON1 is connected by an appliance, the on signal transferred from a terminal CT1 is inputted to the control part 6 so that the control part 6 perceives that the main lead-in hole CON1 is being used.

On the contrary, if the main lead-in hole CON1 is not connected by any appliance, the off signal outputted from the terminal CT1 is transferred to the control part 6 so

that the control part 6 perceives that the main lead-in hole CON1 is not being used. Thus, in this case, the multi-tap (concent) works under only single-acting control, not interlocking control.

If the main lead-in hole CON1 is connected by an appliance, i.e., if an on signal is inputted to the terminal CT1, the user can select the interlocking or single-acting alternatively regarding each appliance corresponding to the auxiliary lead-in hole CON2-CON6 by turning on/off the switches SW1-SW5. Of course, the on/off signals of the switches SW1-SW5 are transferred to the microprocessor of the control part 6 so that the control part 6 can perceive which auxiliary lead-in holes are interlocking controlled or single-acting controlled.

The switch SW6 is disposed outside of the multi-tap (concent) so that the user can select whether the switch should use an illumination sensor or use an illumination sensor and a body-detecting sensor at the same time. In this event, of course, the on/off signals corresponding to the above two options are transferred to the microprocessor of the control part 6 so that the control part 6 can determine whether to receive a signal from only the illumination sensor or both the illumination and body-detecting sensors.

Herein, after the control part 6 perceives the sensor to transfer the signal according to the on-off signal of

the switch SW6, if no change of illumination or no movement of a human body is detected from the sensors, the timer built in the control part 6 is operated to control the standby state or the power saving state. The operation time of the timer can be variably set at the initial manufacturing stage.

The terminal ON/OFF is used when the body-detecting sensor of sensor part 4 is selected as an option. If the on signal is inputted from the terminal, it means that the body-detecting sensor would be used. If the off signal is inputted from the terminal, it means that the body-detecting sensor would not be used. Of course, if the body-detecting sensor is not used, the user selects the illumination sensor or the timer by means of the switch SW6.

FIGS. 5 and 6 are detail circuit diagrams showing the illumination sensor and the body-detecting sensor which are included in the sensor part 4 of FIG. 2.

The operation of the illumination sensor 4A shown in FIG. 5 will be illustrated first.

If the illumination CDS sensor detects light, i.e.,a resistance corresponding to the light is detected, a comparator U2 detects the change of illuminance by comparing the detected resistance with a reference resistance. At this time, an illumination detecting adjuster VR1 can set the reference resistance representing the illuminance of light.

Thereafter, the comparator U2 computes the difference between the resistance of the illumination CDS sensor and the reference resistance, and a signal according to the computation is inputted to a transistor Q5. The signal inputted to the transistor Q5 is converted into an on/off control signal and transferred to the control part 6 through a terminal CDS. Thus, the control part 6 determines a change of illuminance by the signal detected by the illumination sensor. According to the change of illuminance, electric power is supplied or intercepted to each interlocked or single-acted appliance so that the outlet can be controlled with a standby state or a power saving state.

The difference computed from the comparator U2 is amplified through the transistor. According to the signal corresponding to the difference, a display LD1 glows or flashes. Herein, the flashing of the display LD1 represents the change of illuminance, i.e., the multi-tap (concent) is in the illuminance state to be induced to a power saving or standby state.

Next, the operation of the body-detecting sensor 4B of FIG. 6 will be explained.

The body-detecting sensor SS2 detects a change from the blocking of light by a body movement. The detectd signal is transferred to a two-stage amplifier. The amplified detected signal is transferred to a transistor Q6 to be

converted to an on/off control signal, which is determined by the control part 6. Herein, an infrared sensor is mainly used as the body-detecting sensor.

The terminal ON/OFF is used if the body-detecting sensor is selected as an option. If two connectors CN1, CN2 are connected with each other, an on signal is outputted. If they are disconnected, an off signal is outputted.

However, as described above, the present invention is confined to only where the on signal is inputted from the terminal ON/OFF. That is, the present invention will be described on the assumption that the two connectors CN1, CN2 are interconnected.

Thereafter, the control part 6 detects the motion of a human body through the signal detected by the body-detecting sensor. According to the movement change, electric power is supplied or intercepted to each interlocked or single-acted appliance so that the multi-tap (concent) is controlled as the standby or power saving state.

Although it is not shown in the figures, the body-detecting sensor can include a display to visualize the change of movement like the illumination sensor 4A.

FIG. 7 is a detail circuit diagram showing the control part of FIG. 2.

The control part 6 receives the on/off signal of the switches SW1-SW5 of the motion condition setting part 3 through

the terminal and perceives which auxiliary lead-in hole is interlocked or single-acted.

Also, the control part 6 receives the on/off signal of the switch SW6 through the terminal MEN and determines whether to receive the detection signal only from the illumination sensor or from both the illumination and the body-detecting sensors.

Also, the control part 6 receives the on signal of the terminal CT1 when the main lead-in hole CON1 is connected by an appliance, so that it perceives that the main lead-in hole CON1 is being used.

On the contrary, the control part 6 receives the off signal of the terminal CT1 when the main lead-in hole CON1 is not connected by any appliance, so that it perceives that the main lead-in hole CON1 is not being used. Accordingly, in this case, the multi-tap (concent) operates under single-acting control only, which is perceived by the control part 6. The on/off signal of the terminal CT1 is transferred from a first current detecting circuit 5A which will be explained later regarding the detail circuit diagram of the current detecting part of FIG. 8.

As explained above, the control part 6 is initially set by receiving the on/off signal regarding the use of the sensor through the terminal MEN, and by receiving the on/off signal regarding the option of interlocking or single-acting

function through the switches SW1-SW5.

After the initial setting, the control part 6 performs the control to induce each appliance to a standby or power saving state, by the following process: detecting the change of illuminance and the movement of a human body by the on/off signal inputted to the terminals CDS, IRS; detecting the variation of the current flowing into each appliance, which is interlocked or single-acted and connected to auxiliary lead-in hole CON2-CON6, by the current detecting part 5; receives the signal according to the detection through the terminals CT2-CT6; and outputting the on/off control signal to the output control part 7.

Herein, after the control part 6 perceives the sensor to be inputted according to the on/off signal of the switch SW6, if any of the two sensors does not perceive the change of illuminance nor the body motion, the control part 6 activates the built-in timer to control the appliance with the standby or power saving state.

The operation of the control part 6 is performed by comprehensively determining the on/off signals transferred from each of the terminals SW1-SW5, MAIN, MEN, CT2-CT6, CLOCK, CDS, IRS, and by finally inputting the on/off control signal to the output control part 7. At this time, the relay built in the output control part 7 is connected or disconnected according to the on/off control signal so that the power

current flowing into the appliance connected to each lead-in hole CON1-CON6 can be supplied or intercepted. This will be more explained in the detail circuit diagram of the output control part of FIG. 8.

FIG. 8 is a detail circuit diagram showing the current detecting part and the output control part of FIG. 2.

First, the current detecting part 5 is explained.

The current detecting part 5 is composed of a first to sixth current detecting circuits 5A-5F.

The main lead-in hole CON1 is connected to an appliance for interlocking control such as the mainframe of a computer. Herein, the first current detecting circuit 5A detects the current flowing to the appliance and outputs the on/off signal according to the use of the appliance for interlocking to the terminal MAIN of the control part 6 through the circuit CT1. Such operation is conducted at the initial setting stage of the control part 6.

Meanwhile, the auxiliary lead-in holes CON2-CON6 are connected by the appliances such as the peripherals of a computer or the individually operating appliances.

Thereafter, if the control part 6 perceives the illuminance change or the body motion or the built-in timer operates to control the appliance as the standby or power saving state, the first to sixth current detecting circuits 5A-5F detect the variation of the current flowing the

appliances, which are led into each lead-in hole CON1-CON6, and input the detection signal to the terminal MAIN, CT2-CT6 of the control part 6. Herein, the operations regarding a current transformer CT11-CT16, a comparator U2, and a transistor Q13-Q18, which are built in the first to sixth current detecting circuits 5A-5F, are omitted since they are apparent to those skilled in the art.

The sixth current detecting circuit 5F has a current adjusting switch 5-1 therein. By means of the current adjusting switch 5-1, the user can adjust the current value depending on the capacity of each appliance so that the multi-tap (concent) can be compatible with various appliances with different capacities. For example, with a multi-tap (concent) set by a single current capacity, a computer and a battery charger for a mobile phone handset cannot be used without adjusting the capacity since they have different capacities.

Thus, according to the adjustment of the current adjusting switch 5-1, the amplifying rate of the current flowing to the appliance varies. The on/off control signal according to the variation is transferred to the control part 6. The control part 6 can output an appropriate control signal to each appliance even though the appliance with different capacity is inputted.

Although it is not shown in the drawings, a current

detecting sensor (not shown) detects the current of each appliance, which is being used, before the current adjusting switch 5-1 operates. Thereafter, the control part 6 may adjust the current adjusting switch 5-1 in compliance with the capacity of each appliance. Herein, the current detecting sensor can be freely installed at the socket of the multi-tap (concent), at the side of each lead-in hole, etc., at the discretion of the manufacturer or by the user's preference.

Although the current adjusting switch 5-1 is connected to only the sixth current detecting circuit 5F according to the drawings, it is only an example. The current adjusting switch can also be connected to one of the first to fifth current detecting circuits 5A-5E.

Next, the output control part 7 is explained.

The output control part 7 is composed of a first to sixth output control part circuits 7A-7F and operates as follows.

The first to sixth output control part circuits 7A-7F receive the on/off control signal according to the control operation of the control part 6 to induce the appliance to a standby or power saving state. According to the state, the built-in relay element is connected or disconnected so that the current flowing to the appliance, which is led into each lead-in hole CON1-CON6, can be supplied or intercepted.

Hereinafter, a serial control process of the

multifunctional multi-tap (concent) of intercepting a stand-by electric power according to the present invention will be explained.

FIG. 9 is a motion flow chart showing a control method of the multifunctional multi-tap (concent) of intercepting a stand-by electric power according to the present invention, if an illumination sensor is used. FIG. 10 is a motion flow chart showing a control method of the multifunctional multi-tap (concent) of intercepting a stand-by electric power according to the present invention, if an illumination sensor and a body-detecting sensor are used at the same time.

The control part 6 receives an on/off signal according to the user's switching of SW6 operation to determine whether the control is to be made by using only the illumination sensor or both the illumination sensor and the body-detecting sensor at the same time.

With reference to FIG. 9, if only the illumination sensor is used, the control process of the multifunctional multi-tap (concent) of intercepting a stand-by electric power according to the present invention is as follows.

First, an illumination sensor 4A of the sensor part 4 detects a change of illuminance [S10]. If the change of illuminance is not detected, i.e., there is no illuminance change, the timer built in the control part 6 operates for a predetermined time period to control an interlocked or

single-acted appliance as a standby or power saving state [S11]. At this time, the predetermined time period can be set as the most efficient time for the power saving purpose.

Thereafter, the timer determines that the predetermined time period has passed [S12]. As a result of the determination of S12, if a change of illuminance is detected before the predetermined time period has passed, then the control part 6 clears the timer [S13], and puts the main lead-in hole CON1 as a standby state [S14].

If the main lead-in hole CON 1 for interlocking function is not used, only the auxiliary lead-in holes CON2-CON6 are detected to determine whether they are used under interlocking or single-acting control. However, the control method of the present invention is confined to where the main lead-in hole CON1 is interlocked with at least one auxiliary lead-in hole CON2-CON6.

Thereafter, the control part 6 determines which auxiliary lead-in holes CON2-CON6 are interlocked or single-acted [S15]. The determination is made based on the on/off signal which is transferred to the terminals SW1-SW5 from the motion condition setting part 3 according to the user's switching operation.

As a result of S15, if a predetermined number of the auxiliary lead-in holes CON2-CON6 are used with interlocking control, the control part 6 determines whether the main lead-in

hole CON 1 is being used at present [S16]. The determination is made based on the on/off signal of the terminal CT1 which depends upon the variation of the current of the current detecting part 5.

As a result of S16, if the main lead-in hole CON1 is presently being used, the control part 6 turns on all the predetermined number of the interlocked auxiliary lead-in holes [S17]. To perform this operation, the control part 6 outputs the on/off control signal to the relay of the output control part 7. In other words, since the main lead-in hole CON1, which is under the standby state, is presently being used, the predetermined number (or all) of the auxiliary lead-in holes, which are interlocked with the main lead-in hole CON1, are controlled to be on (standby state).

However, as the result of S16, if the main lead-in hole CON1 is not being used at present, the control part 6 turns off all the predetermined number of the interlocked auxiliary lead-in holes [S18]. Consequently, since the main lead-in hole CON1, which has been under the standby state, is presently not being used, the predetermined number (or all) of the auxiliary lead-in holes, which are interlocked with the main lead-in hole CON1, are controlled to be off (power saving state).

Meanwhile, as a result of S15, if a predetermined number of the auxiliary lead-in holes CON2-CON6 are used with

single-acting control, the control part 6 turns off all the single-acted auxiliary lead-in holes [S19]. This is independently performed by the control part 6 separately from the standby state of the main lead-in hole CON1.

The following is an explanation regarding the control by the operation of the timer.

As a result of S12, if the predetermined time period has passed, the control part 6 determines which auxiliary lead-in holes CON2-CON6 are interlocked or single-acted [S20]. As a result of S20, if a predetermined number of the auxiliary lead-in holes CON2-CON6 are used with interlocking control, the control part 6 determines whether the main lead-in hole CON 1 is being used at present [S21].

As a result of S21, if the main lead-in hole CON1 is presently being used, the control part 6 turns on all the predetermined number of the interlocked auxiliary lead-in holes including the main lead-in hole CON1 [S22].

However, as a result of S21, if the main lead-in hole CON1 is not being used at present, the control part 6 turns off all the predetermined number of the interlocked auxiliary lead-in holes including the main lead-in hole CON1 [S18].

Consequently, through such a process [S20-S23], the main lead-in hole CON1 and the auxiliary lead-in holes interlocked with the main lead-in hole are all controlled to be on (standby state) or off (power saving state).

Meanwhile, as a result of S20, if a predetermined number of auxiliary lead-in holes are only single-acting, i.e., if a predetermined number of auxiliary lead-in holes are individually used while the main lead-in hole CON1 is not being used, the control part 6 determines whether the predetermined number of the auxiliary lead-in holes which are single-acting are presently being used [S24]. This determination is made based on the on/off signal of the terminal ct2-CT6 which depends on the variation of the current of the current detecting part 5.

As a result of S24, if the predetermined number of the single-acting auxiliary lead-in holes are presently being used, the control part 6 turns on all the predetermined number of the auxiliary lead-in holes [S25]. To perform this operation, the control part 6 outputs the on/off control signal to the relay of the output control part 7.

However, as a result of S24, if the predetermined number of the single-acting auxiliary lead-in holes are not being used presently, the control part 6 turns off all the predetermined number of the auxiliary lead-in holes [S25].

Consequently, through such a process [S20, S24, S25], the auxiliary lead-in holes which are single-acting are all controlled to be on (standby state) or off (power saving state).

The main lead-in hole CON1 and the auxiliary lead-in

holes CON2-CON6, which are controlled in a power saving state or a standby state, repeat the above control process by the control part 6 which controls and determines according to the change of illuminance.

Next, if the illumination sensor and the body-detecting sensor are used at the same time, the control process of the multifunctional multi-tap (concent) of intercepting a stand-by electric power according to the present invention is as follows.

First, an illumination sensor 4A of the sensor part 4 detects a change of illuminance or a movement of a human body [S30]. If the change of illuminance or the body movement is not detected, the timer built in the control part 6 operates for a predetermined time period to control an interlocked or single-acted appliance as a standby or power saving state [S31]. At this time, the predetermined time period can be set considering the most efficient mode for the power saving purpose.

Thereafter, the timer determines that the predetermined time period has passed [S32]. As a result of the determination of S32, if a change of illuminance or a body motion is detected before the predetermined time period has passed, then the control part 6 clears the timer [S33], and puts the main lead-in hole CON1 in a standby state [S34].

The following process S35-S46 for the control is omitted

since they are the same as the process in S15-S26.

As described so far, the multifunctional multi-tap (concent) of intercepting a stand-by electric power according to the present invention has the illumination sensor or the body-detecting sensor to detect the illuminance change or body movement around each lead-in hole which is under interlocking or single-acting control, has the control part to control each lead-in hole as a standby or power saving state according to the interlocking or single-acting condition by determining the detected signal, and is compatible with various appliances with different capacity by adjusting the electric current according to the respective appliances.

While the multifunctional multi-tap (concent) of intercepting a stand-by electric power and the control method of the present invention have been described with reference to a preferred embodiment thereof, it will be understood by those skilled in the art that various changes or modifications may be made therein without departing from the spirit and scope of the invention.

For example, for the sensor part 4, a phototransistor, other light sensor, a sound sensor, or a heat sensor can be used in addition to the CDS sensor or the infrared sensor. Also, some of the sensors can be used at the same time.

Also, although only six lead-in holes are shown in the

above embodiment, the number of the lead-in holes can be set at the discretion of the manufacturer or the user.

Also, each part of the present invention, i.e., an over-current interceptor, a power part, a motion condition setting part, a current detecting part (current adjusting switch), a control part, and an output control part can be installed within an appliance or a plug as well as the multi-tap (concent).

As explained, the multifunctional multi-tap (concent) of intercepting a stand-by electric power performs an interlocking control of the subordinated appliances by means of the illumination sensor or the body-detecting sensor.

Also, the multifunctional multi-tap (concent) of intercepting a stand-by electric power according to the present invention has the illumination sensor or the body-detecting sensor, which is compatible with various appliances with different capacities by adjusting the electric current according to the respective appliances.

Also, the multifunctional multi-tap (concent) of intercepting a stand-by electric power according to the present invention detects the illuminance change or body movement around each lead-in hole which is under interlocking or single-acting control by the illumination sensor or the body-detecting sensor, and controls each lead-in hole as a standby or power saving state according to the interlocking

or single-acting condition by the control part determining the detection signal.